CLAIMS

What is claimed is:

1. A method of manufacturing zirconia-alumina body, comprising:

mixing zirconia, yttria, and alumina with at least one solvent to form a mixture;

drying said mixture;

disposing said dried mixture adjacent to an unfired alumina body; and

co-firing to form the zirconia-alumina body, wherein said zirconia-alumina body comprises about 1 weight% to about 45 weight% monoclinic phase zirconia, based upon the total weight of the zirconia.

2. The method of manufacturing zirconia-alumina body of Claim 1, further comprising mixing at least one dispersant into the mixture, and wherein the zirconia-alumina body comprises about 15 weight% to about 30 weight% monoclinic phase zirconia.

3. The method of manufacturing zirconia-alumina body of Claim 2, wherein said dispersant is selected from the group consisting of phosphate ester, Menhaden fish oil, sulfosuccinate, castor oil, and mixtures comprising at least one of the foregoing.

4. The method of manufacturing zirconia-alumina body of Claim 1, further comprising adding at least one binder and at least one plasticizer to said mixture.

5. The method of manufacturing zirconia-alumina body of Claim 4, further comprises de-airing said mixture.

6. The method of manufacturing zirconia-alumina body of Claim 1, wherein the zirconia-alumina body comprises about 18 weight% to about 25 weight% monoclinic phase zirconia.

7. The method of manufacturing zirconia-alumina body of Claim 4, wherein said at least one binder is selected from the group consisting of polyvinyl butyral, poly methyl methacrylate, poly vinyl formal, and mixtures comprising of at least one of the foregoing.

8. The method of manufacturing zirconia-alumina body Claim 4, wherein said at least one plasticizer is selected from the group consisting of butyl benzyl phthalate, glycols, phthalates, and mixtures comprising at least one of the foregoing.

9. The method of manufacturing zirconia-alumina body of Claim 1, wherein said laminated mixture and said alumina surface have a sintering mismatch of less than about 5%.

10. The method of manufacturing zirconia-alumina body of Claim 1, wherein said co-firing is performed at a temperature about 1,375°C to about 1,550°C.

11. The method of manufacturing zirconia-alumina body of Claim 10, wherein said co-firing is performed at a temperature of about 1,500°C to about 1,530°C.

12. The method of manufacturing zirconia-alumina body of Claim 1, wherein said at least one solvent is selected from the group consisting of xylene, ethanol, and mixtures comprising at least one of the foregoing.

13. The method of manufacturing zirconia-alumina body of Claim 1, wherein the zirconia-alumina body comprises up to about 95 mole% zirconia, up to about 10 mole% yttrium oxide, and up to about 10 mole% alumina, based upon the total weight of the zirconia-alumina body.

14. The method of manufacturing zirconia-alumina body of Claim 13, wherein the zirconia-alumina body comprises about 85 to about 93 mole% zirconia, about 3 to about 7 mole% yttrium oxide, and about 3 to about 7 mole% alumina, based upon the total weight of the zirconia-alumina body.

15. The method of manufacturing zirconia-alumina body of Claim 1, further comprising metallizing the unfired zirconia body to form an electrode on a first side and a second side of said zirconia body.

16. A method of manufacturing a sensor, comprising:

mixing zirconia, yttria, and alumina with at least one solvent to form a mixture;

drying said mixture to form an unfired zirconia body;

disposing an electrode on each side of said unfired zirconia body;

connecting each electrode to an electrical lead;

disposing said unfired zirconia body adjacent to an unfired alumina surface to form an unfired zirconia-alumina body, wherein one of said electrodes is disposed between said zirconia body and said alumina body; and

co-firing to form the sensor, wherein the co-fired zirconia-alumina body comprises about 1 weight% to about 45 weight% monoclinic phase zirconia, based upon the total weight of the zirconia.

17. A method of manufacturing a sensor as in Claim 16, further comprising disposing a protective layer adjacent to said unfired zirconia body on a side opposite said unfired alumina body.

18. A method of manufacturing a sensor as in Claim 16, further comprising disposing support layers adjacent to said unfired alumina body, with a heater disposed within said support layers.

19. A method of manufacturing a sensor as in Claim 18, further comprising disposing a ground plane in said support layers, between said heater and said alumina body.

20. The method of manufacturing zirconia-alumina body of Claim 16, wherein the zirconia-alumina body comprises about 15 weight% to about 30 weight% monoclinic phase zirconia.

21. The method of manufacturing zirconia-alumina body of Claim 16, wherein the zirconia-alumina body comprises about 18 weight% to about 25 weight% monoclinic phase zirconia.

22. The method of manufacturing zirconia-alumina body of Claim 16, further comprising adding at least one binder and at least one plasticizer to said mixture.

23. The method of manufacturing zirconia-alumina body of Claim 22, further comprises de-airing said mixture.

24. The method of manufacturing zirconia-alumina body of Claim 22, further comprising at least one dispersant selected from the group consisting of phosphate ester, Menhaden fish oil, sulfosuccinate, castor oil, and mixtures comprising at least one of the foregoing.

25. The method of manufacturing zirconia-alumina body of Claim 22, wherein said at least one binder is selected from the group consisting of polyvinyl butyral, poly methyl methacrylate, poly vinyl formal, and mixtures comprising of at least one of the foregoing.

26. The method of manufacturing zirconia-alumina body Claim 22, wherein said at least one plasticizer is selected from the group consisting of butyl benzyl phthalate, glycols, phthalates, and mixtures comprising at least one of the foregoing.

27. The method of manufacturing zirconia-alumina body of Claim 16, wherein said laminated mixture and said alumina surface have a sintering mismatch of less than about 5%.

28. The method of manufacturing zirconia-alumina body of Claim 16, wherein said co-firing is performed at a temperature about 1,375°C to about 1,550°C.

29. The method of manufacturing zirconia-alumina body of Claim 28, wherein said co-firing is performed at a temperature of about 1,500°C to about 1,530°C.

30. The method of manufacturing zirconia-alumina body of Claim 16, wherein said at least one solvent is selected from the group consisting of xylene, ethanol, and mixtures comprising at least one of the foregoing.

31. The method of manufacturing zirconia-alumina body of Claim 16, wherein the zirconia-alumina body comprises up to about 95 mole% zirconia, up to about 10 mole% yttrium oxide, and up to about 10 mole% alumina, based upon the total weight of the zirconia-alumina body.

32. The method of manufacturing zirconia-alumina body of Claim 31, wherein the zirconia-alumina body comprises about 85 mole% to about 93 mole% zirconia, about 3 mole% to about 7 mole% yttrium oxide, and about 3 mole% to about 7 mole% alumina, based upon the total weight of the zirconia-alumina body.

33. The sensor of Claim 16.

34. A method for sensing oxygen, comprising:

disposing a sensor in an exhaust stream, said sensor comprising a co-fired zirconia body and an alumina body with an electrode disposed on a first side of said zirconia body and a second electrode disposed on a side opposite said first electrode, between said zirconia body and said alumina body, wherein the co-fired comprises about 1 weight% to about 45 weight% monoclinic phase zirconia, based upon the total weight of the zirconia;

contacting said first electrode with exhaust gas; and

sensing oxygen in the exhaust gas.

35. The method for sensing oxygen of Claim 34, wherein the zirconia-alumina body comprises about 15 weight% to about 30 weight% monoclinic phase zirconia.